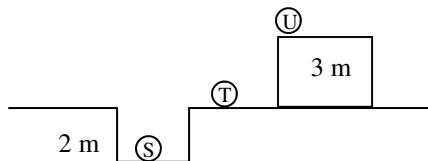


From now on I strongly suggest that you write your Conservation of Energy equation for each problem. It tells you "stuff". I assume, now, that you can all write them. See the Energy Study Helps, if you need more help.

1. \* An object is 45 m above the ground when it is dropped. How fast is the object going just before it hits the ground?  
(Write the Conservation of Energy formula, then solve.)
  
2. A 4 kg object is moving 2 m/s when it is pushed by a 5 N force for 7 m along a level surface.
  - A. How fast is it going afterwards?
  
  - B. What is the change of potential energy of the object?
  
3. A 100 N object is at rest on the ground. It is lifted up 8 m.
  - A. Is 100N the mass or the weight of the object?  
*So, N is a force or mg in mgh, already...*
  - B. \* How much work was done to lift the object?
  
  - C. How much gravitational potential energy does it gain?
  
  - D. \* How long would it take a 400 W motor to lift it?
  
4. Let's learn to break up a unit, the joule:
  - A. Write the basic equation for work:
  
  - B. \* Put in what "F" equals (*and don't get angry*):
  
  - C. Substitute in the units for each one and combine like terms.
  - D. \* So, what does a joule equal in more basic units?
  
5. Using what you just found, give the units of power using only basic units.
  
6. A 5 kg mass is at rest on a level surface. It is pushed until it reaches 12 m/s in 8 seconds.
  - A. How much work was done on the object?
  
  - B. How much power was used to push the object?
  
7. For each of the following, is work being done (*and why or why not*)?
  - A. \_\_\_\_ A person holds a book in their hands for 20 minutes.
  - B. \_\_\_\_ A force pushes down on a table.
  - C. \_\_\_\_ A person pushes a sled across the snow.
  - D. \_\_\_\_ Gravity keeping the moon moving around the earth.

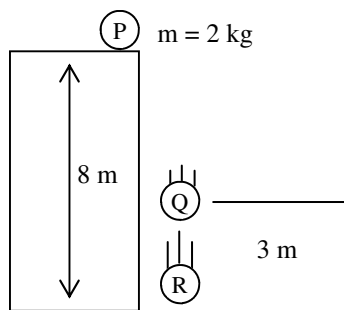
*Definition: Mechanical energy = any PE or KE.*

8. A 6 kg box is moving 8 m/s when it slides over a 3 m long patch of sandpaper. Afterwards the box is moving 3 m/s.
  - A. How much mechanical energy did it lose?
  
  - B. Where was the energy "lost" and what did it become?



9. Three identical 1 kg objects are placed as shown in the diagram.
- Since object T is sitting on the ground, how much potential energy does it have?
  - How much potential energy does object U have relative to the middle object?  
*This is how much work would be done to lift U to this point.*
  - If T is at  $h = 0$  m, then object S is at  $h = \underline{\hspace{2cm}}$ . (below 0)
  - \* What is the potential energy of object S relative to the ground?

*Object S is in a hole, so it would take energy to lift it out. This is how an object can have negative potential energy and why we usually ASSUME that we have defined  $PE = 0J$  at the ground. But PE can be defined anywhere. Let's see how that could be helpful...*



10. A ball is dropped from 8 m. How fast is it going 3 m above the ground?
- If we define point O as our reference point ( $h = 0$  m), how far did it drop?
  - \* Calculate its speed at point O.